Claims

1. A method for the production of metal salts, wherein the cationic metal is any metal cation, preferably at least one metal selected from Group I to IV metals including 3d transition metals and lanthanoides (rare earth metals) and mixtures thereof, and wherein the anionic group is selected from phosphates, borates, silicates, sulfates, carbonates, hydroxides, fluorides and mixtures thereof, and wherein said method comprises forming a mixture of at least one metal source that is a metal carboxylate with a mean carbon value per carboxylate group of at least 3 and at least one anion source into droplets and oxidizing said droplets in a high temperature environment.

2. The method of claim 1 wherein the mean carbon value per carboxylate group is at least 4, preferably at least 5, most preferred between 5 and 8.

3. The method of claim 1 or 2 wherein the metal carboxylate and the anion source, in particular the phosphate or phosphate precursor comprising droplets are oxidized in a flame.

4. The method of anyone of the preceding claims wherein the metal carboxylate prior to being formed into droplets has a viscosity of at most 100 mPas, preferably at most 40 mPas, more preferably at most 20 mPas.

5. The method of claim 4, wherein the viscosity is obtained by heating and/or by providing a mix of the at least one metal carboxylate, the at least one anion source and at least one viscosity reducing solvent.

6. The method of claim 3 wherein the viscosity reducing solvent comprises up to 100 % acid(s), preferably C1 to C10 carboxylic acids, much preferably in amounts of less than 50 %.

7. The method of claim 6 wherein the solvent comprises no acid.

8. The method of anyone of claims 5 to 7, wherein the solvent comprises at least one low molecular weight and/or low viscosity apolar solvent, in particular an aromatic or aliphatic, unsubstituted, linear or branched hydrocarbon, preferably a solvent selected from the group consisting of toluene, xylene, lower aliphatic hydrocarbons and mixtures thereof.

9. The method of anyone of the preceding claims, wherein the metal carboxylate is selected from the group consisting of C1 to C18 carboxylates and mixtures thereof, preferably C4 to C12 carboxylates and mixtures thereof, much preferably C5 to C8 carboxylates and mixtures thereof, in particular octoates such as 2-ethylhexanoic acid salts.

10. The method of anyone of the preceding claims, wherein the sum of cationic metals is selected from Group I to IV metals including 3d transition metals and lanthanoides and wherein at least 80 atom% of all metals are calcium, preferable at least 90 atom%, much preferable at least 96 atom% of all cations are calcium.

11. The method of anyone of the preceding claims, wherein the sum of cationic metals comprises calcium and at least one further metal selected from magnesium, zinc, strontium, barium, rare earth metals, in particular gadolinium, and mixtures of two or more of the above-mentioned metals.

12. The method of anyone of the preceding clams, wherein the sum of anionic groups comprises anionic groups selected from phosphates, hydroxides, carbonates, fluorides and mixtures thereof in amounts of at least 90 mol-% of the theoretically calculated necessary amount of anions if electron neutrality in the salt is assumed, preferably at least 95 %, much preferred at least 98%, whereby preferably phosphate is present, much preferred in amounts resulting in compounds with a metal : phosphate molar ratio of 3:1 to 1:1.

13. The method of claim 12 wherein the sum of anionic groups furthermore comprises anionic groups selected from silicates, sulfates and mixtures thereof.

14. The method of anyone of the preceding claims wherein the anion source comprises

- a phosphate source selected from inorganic phosphorous compounds and/or organophosphorous compounds soluble in solvents or solvent mixtures having an enthalpy of at least 13 kJ/g, preferably at least 22.5 kJ/g, most preferred at least 25.5 kJ/g, in particular phosphoric acid and/or organic esters of phosphoric acid and/or phosphines, in particular phosphorous compounds constituting solvents or leading to solvent mixtures with the above-mentioned properties, and/or

- a fluoride source being a fluoride derivative of an organic compound, said fluoride derivative being soluble in the above defined solvent or solvent mixture, in particular trifluoroacetic acid, and/or

- a silicate source selected from organic silicates and/or organosilicon compounds soluble in the above defined solvent or solvent mixture, in particular tetraethyl silicate,

- a sulfate source selected from organic sulfur containing compounds and/or sulfuric acid said sulfate source being soluble in the above defined solvent or solvent mixture, in particular dimethyl sulfoxide (DMSO), and/or

- a carbonate source selected from any organic carbon source, such as hydrocarbons, carboxylic acids, alcohols, metal carboxylates and mixtures thereof.

15. The method of anyone of the preceding claims wherein the metal salt is selected from the group consisting of amorphous tricalciumphosphate, alpha-tricalciumphosphate, beta-tricalciumphosphate, apatites and mixtures thereof.

16. The method of claim 15, wherein the apatite is selected from $Ca_{10}(PO_4)_6(OH)_{2x}F_{2y}(CO_3)_z$ whereby

x, y and z each range from 0 to 1 and the sum of x + y + z is 1.

17. The method of claim 15 or 16, wherein the compound formed is an at least 96 %, preferably an at least 98 %, more preferably an at least 99 % pure product selected from amorphous tricalciumphosphate, alpha-tricalciumphosphate or beta-tricalciumphosphate or hydroxyapatite or fluorapatite or hydroxyfluorapatite.

18. The method of anyone of the preceding claims wherein the flame oxidation is performed in a spray burner, or in particular in an oil burner.

19. The method of anyone of the preceding claims wherein the oxidation is performed at a temperature of at least 600°C, preferably at least 800°C, more preferably at least 1000°C and most preferably in a range of 1200 to 2600°C, in particular at about 1600 °C.

20. The method of anyone of the preceding claims wherein the metal carboxylate is prepared starting from a metal oxide, a metal hydroxide, a metal carbonate, a metal halide, such as a chloride or bromide, or a metal lower alkyl oxide, in particular a C1 to C4 alkyl oxide.

21. The method of anyone of the preceding claims, wherein the enthalpy of the metal carboxylate or the metal carboxylate comprising solution is at least 13 kJ/g, preferably at least 18 kJ/g, more preferred at least 22.5 kJ/g and most preferred at least 25.5 kJ/g.

22. The method of anyone of the preceding claims, wherein the solution comprises at least one metal source in an amount corresponding to at least 0.15 moles metal(s) per liter, and at least one anion source in an amount corresponding to at least 0.05 moles anionic group(s) per liter.

23. The method of anyone of the preceding claims wherein the as produced metal salt is reduced in carbonate content by a heat treatment, optionally in the presence of humidity and/or subjected to a tempering/sintering procedure.

24. The method of anyone of the preceding claims wherein the metal salt is produced in a flame with insufficient oxygen for full combustion or conversion of the reactants resulting in the formation of substoichiometric salts.

25. A metal salt obtainable by the method of anyone of claims 1 to 24.

26. A metal salt, in particular according to claim 25, that does not release more than 7.5 wt% water upon heating to 900 °C at a heating rate of 10 °C per minute, preferably less than 5 wt%, most preferred less than 4.5 wt%.

27. A metal salt, in particular according to claim 25 or 26, that releases more than 90 wt% of all water upon heating to 500 °C at a heating rate of 10 °C per minute, preferably, upon heating to 400 °C, most preferably upon heating to 350 °C.

28. A metal salt, in particular according to anyone of claims 25 to 27 that has percolating phases.

29. The metal salt of anyone of claims 25 to 28 that is a biomaterial.

30. The metal salt, in particular according to anyone of claims 25 to 29, which is a tricalciumphospate, in particular an amorphous tricalciumphosphate with a bulk density in the range of 100 to 300 kg/m^3, or beta- tricalciumphospate with a bulk density of below 800 kg/m^3 or alpha- tricalciumphospate with a bulk densitybelow 500 kg/m^3.

31. The metal salt, in particular according to anyone of claims 25 to 30, which is a tricalciumphospate, in particular alpha- tricalciumphospate whith a specific surface area (measured by nitrogen adsorption at -196°C according to the BET-method) of more than 3 m^2/g, preferably more than 5 m^2/g and more preferably more than 8 m^2/g, or beta- tricalciumphospate whith a specific surface area (measured by nitrogen adsorption at -196°C according to the BET-method) of more than 1 m^2/g, pre-

ferably more than 1.5 m^2/g and more preferably more than 2 m^2/g.

32. Use of a metal salt obtainable by the method of anyone of claims 1 to 24 or according to anyone of claims 25 to 31 in medical applications, e.g. as bone cement and/or resorbable material for implants, as additive to tooth pastes, e.g. as fluoride source and/or abrasive aid, as fluoride source in foodstuffs, e.g. chewing gums, sweets and table salt, as catalyst support, as molecular sieve, as filler for polymers, as UV stabilizer and/or degradation activator in biodegradable or bioresorbable materials.